

(Industrial Partner- AEPONYX) PhD in Heterogeneous Photonic Systems Integration for Telecom and Quantum Computing

Record number : OPR-1084

Overview

RESEARCH DIRECTION

Serge Ecoffey, Professeur sous octroi de recherche - Department of Electrical and Computer Engineering

INFORMATION

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ADMINISTRATIVE UNIT(S)

Faculté de génie
Département de génie électrique et de génie informatique
Institut interdisciplinaire d'innovation technologique (3IT)

LEVEL(S)

3e cycle

LOCATION(S)

3IT - Institut interdisciplinaire d'innovation technologique
C2MI - Centre de Collaboration MiQro
Innovation

Project Description

Context:

AEPONYX aims to develop an innovative technology platform dedicated to the integration and assembly of heterogeneous photonic circuits, with the ambition of profoundly transforming the strategic sectors of advanced telecommunications and quantum computing. Currently, photonic integration approaches suffer from major technical and economic limitations: complex and costly processes, low integration density, and significant optical losses at material or component interfaces. These constraints hinder the deployment of compact, high-performance, and industrially competitive photonic systems.

In this context, the project led by the Université de Sherbrooke (UdeS) and AEPONYX seeks to overcome these limitations by developing a modular, adaptable, and high-yield platform capable of efficiently integrating photonic and quantum components from different technologies into a single system. This development will pave the way for new generations of high-performance hybrid systems, meeting the growing needs of future quantum and telecom applications.

Objective:

The goal of the PhD is to combine heterogeneous integration, MEMS microfabrication, and advanced assembly technologies to develop robust, reproducible integration processes compatible with industrial production lines. These processes will be used to manufacture cutting-edge photonic devices for quantum applications.

This interdisciplinary project spans a wide range of fields, from physics and materials science to photonics, electrical, and mechanical engineering. The system at the heart of the project raises both fundamental (optics, photonics, quantum physics) and applied (fabrication, integration) research questions due to the unique challenges posed by the components and their heterogeneity.

The PhD candidate will work closely with expert teams from AEPONYX, the MiQro Innovation Collaborative Centre (C2MI), and the Interdisciplinary Institute for Technological Innovation (3IT), benefiting from an exceptional environment at the interface of industry and

academic research.

Work Environnement:

AEPONYX is a recognized leader in hybrid photonic integration with a portfolio of products in telecommunications and data centers, and a growing presence in the quantum field, notably through its acquisition by Pasqal, the global leader in neutral atom quantum computing. AEPONYX has developed cutting-edge expertise not only in integrated photonics but also in packaging, control electronics, and testing, enabling it to offer turnkey solutions from design to production. Based in Montreal with offices at C2MI, AEPONYX innovates using well-established and reliable technologies to deliver robust, market-leading solutions.

C2MI is Canada’s largest R&D center for electronic systems, with infrastructure and laboratories for industrial-scale microfabrication of microelectronic systems. It also offers the expertise and capabilities to develop and commercialize innovative electronic systems and prototypes essential to the digital revolution. Students will benefit from an exceptional research environment combining academic and industrial partners working together to develop and commercialize future technologies.

At UdeS, the 3IT is a driver and showcase for innovative, socially and economically responsible university and industrial research practices. The 3IT.nano and 3IT.micro platforms specialize in nanofabrication and microelectronic assembly. They are part of the integrated digital innovation chain with the Institut Quantique (IQ) and C2MI to develop proof-of-concept systems that can be transferred to industrial production lines. The 3IT platforms house over \$50M in state-of-the-art microelectronic equipment, supported by a team of 20 staff assisting researchers, students, and industrial partners.

Candidate Profile:

- Specialization in materials engineering, physics, or electrical engineering
- Strong adaptability, autonomy, rigor, and problem-solving mindset
- Keen interest in design, experimental work, and teamwork
- Knowledge in microelectronics, photonics, and microfabrication/integration processes
- Fluent in French and/or English

Discipline(s) by sector

Funding offered

Partner(s)

Yes

AEPONYX

Sciences naturelles et génie

Génie électrique et génie électronique

The last update was on 23 October 2025. The University reserves the right to modify its projects without notice.